

THE MINERAL INDUSTRY OF DENMARK, FAROE ISLANDS, AND GREENLAND

By Harold R. Newman

Denmark's mineral resources are concentrated mainly in natural gas and petroleum fields in the North Sea that have, together with renewable energy, made Denmark a net exporter of energy since 1996. Employment in the nonfuels minerals industry (mining and quarrying, basic metal industry, etc.) accounted for about 2% of total employment.

Private ownership and exploitation of minerals are allowed under Danish law. A tax of \$0.91 per cubic meter was levied against all extracted minerals, regardless of type or ownership. However, this tax is exempted if the mineral is exported. The permitting procedure for mineral production is executed by individual counties, and the environmental regulations are at a level comparable to the other European Union (EU) member countries.

The mining and metal industry works closely with the Ministry of Environment and Energy, the Danish Environmental Protection Agency, local and community governments, and citizen groups to minimize any adverse effects to the environment. Environmental protection is the main focus of the Danish Environmental Protection Agency. A common goal of the steelworks and other industrial concerns is to make use of as much raw material taken into the plant as possible and to maximize the use of any byproducts, such as flue dusts.

The Danish Environmental Protection Agency has proposed a ban on the import, sale, and production of compounds of lead and products that contain compounds of lead. Almost every major and minor use of lead in Denmark could be hit by this proposed ban with the exception of batteries, which were not included in the ban. A time limit would be applied for the elimination of the applications (Metal Bulletin, 1997).

Continued close cooperation with the other member countries of the EU is very important for Denmark because these countries remain the major export markets. Most of the mineral commodities produced in Denmark were exported with a majority shipped to EU countries.

Denmark's steel industry is small compared with the majority of other EU countries and, as a result of its size, was not affected by the proposed cuts being studied by the European Commission in its efforts to make the EU steel industry more competitive with those of other countries. (*See table 1.*)

Denmark has no known economically exploitable reserves of metallic ores; but it does have large reserves of nonmetallic materials such as chalk, diatomaceous earth, limestone, and sand and gravel. Denmark's industrial minerals sector is based on easily accessible materials such as chalk and limestone and is well developed. Cement, chalk for paper filler, ground limestone, and

lime, including agricultural and burnt, are produced. The structure of the Danish mineral industry, listing its major components, is shown in table 2.

Denmark is the only commercial producer of moler, which consists of a natural mixture of diatomite and from 20% to 25% smectite clay. Moler has a variety of applications and is an important ingredient of insulation bricks.

Petroleum production continued to exceed consumption, allowing Denmark to stay self-sufficient in petroleum. An increase in natural gas production allowed the continued exporting of about 20% of Denmark's production. Danish Underground Consortium (DUC) is responsible for virtually the entire production from Denmark's North Sea petroleum and natural gas fields. Denmark is the third largest producer in western Europe after Norway and the United Kingdom. A.P. Moeller Group owns 39% of DUC. Its two partners, Shell and Texaco, own 46% and 15% respectively. DUC's production from 12 fields exceeds the total Danish oil and gas consumption.

Faroe Islands

The Faroe Islands, a self-governing overseas administrative division of Denmark, has no known mineral reserves. The economy remains dependent on fisheries, which collapsed in the early 1990's, causing an economic crisis. However, this could change if a dispute with the United Kingdom over a wide strip of sea between the Faroe Islands and the Shetland Islands, which has continued for the past few years, is eventually settled in favor of the Faroes. The dispute concerned the boundary of the economic zone of the Faroe Islands and the Shetland Islands and intensified as a result of oil having been discovered in the Shetland zone less than 20 kilometers (km) from the present boundary and in the disputed zone. Commercially viable findings of oil or natural gas have not been found on the Faroe Islands.

The principal involvement of the Faroe Islands in the international minerals industry has been as a market for imported materials to support the local fishing-based economy. The imports are principally fuels, fertilizer materials, and building products such as cement.

Greenland

Since the cessation of mining activities in 1990, Greenland, a self-governing overseas administrative division of Denmark, has been looking for a means of diversifying its economy, which is presently based almost entirely on fishing and hunting. Recent

legislation created favorable licensing terms and investment rules. This, together with diverse rock types in its geology, has resulted in increased mineral exploration in Greenland.

In 1997, several companies conducted exploration over more than 28,000 square kilometers (km²). Exploration has been directed toward base metals, diamonds, gold, industrial minerals, iron, nickel, and platinum-group metals. Both the Danish and Greenland Governments are actively encouraging mineral exploration activities, and the Geological Survey of Denmark and Greenland provides support where possible.

Platinova A/S reported the recovery of a microdiamond from a sample of kimberlite boulders on a lake shore in central west Greenland. The 0.01 carat diamond was recovered from a sample taken from Platinova's 4,332 km² exploration concession. Since the discovery Platinova has also found a number of kimberlite boulders and dykes and was planning on conducting a detailed airborne geophysical survey of the area (Mining Journal, 1997).

The joint-venture exploration project of Dia Met Minerals Ltd., Canadian Mountain Minerals Ltd., and Quadrant Resources reported that it had discovered 200 kimberlite float occurrences and four outcropping kimberlite dykes. One of the dykes tested positive for diamonds. The joint venture reportedly would spend \$3.8 million in 1997-98 to complete helicopter-supported geophysics and to continue the exploration program, including followup heavy-mineral sampling (Dia Met Minerals, 1997, Greenland joint venture for diamonds, August 11, 1997, accessed April 20, 1998, on the World Wide Web at URL <http://www.diamet.com/110897.html>).

Denmark and Greenland awarded an international consortium a license for offshore petroleum and natural gas exploration and exploitation off Nuuk in West Greenland. The consortium is headed by Statoil of Norway and Philips Petroleum of the United States, which each holds 38.25% of shares. The consortium also includes the Danish-Greenland group Nunoil, which holds 15%, and Denmark's Dopas, which owns 8.5%. Preliminary seismic surveys have indicated that the offshore area known as Fylla Banke, located in the Baffin Sea some 50 km to 150 km west of

Nuuk, appears to contain large quantities of natural gas and some petroleum.

The subsea continental shelf along Greenland's western coast would appear to contain natural gas and petroleum reserves similar to those in the North Sea. However, the waters are more than 1,000 meters deep; and special technology would be required to exploit the deposits. Statoil was carrying out seismic surveys in 1997, and the first exploratory well was expected to be drilled in 1998 at the earliest. The concession covers an area of 9,487 km² and has been awarded for two 4-year periods until December 31, 2004 (Alexander's Gas & Oil Connections, 1996, NK-US Consortium wins oil and gas license off Greenland, December 1996, accessed April 21, 1998, on the World Wide Web at URL <http://www.gasandoil.com/goc/company/cne65102.htm>).

Denmark has a well-developed modern transportation system. There are standard gauge rail lines totaling 2,770 km in length. Highways consisted of 66,482 km, of which 64,551 km were paved. Inland waterways totaled 417 km. Principal ports were Ålborg, Århus, Copenhagen, Esbjerg, and Frederica. There were numerous secondary and minor ports.

Denmark and Greenland have a political and administrative relationship. The Denmark Government is actively seeking to develop both area's nonfuel mineral resources, particularly in Greenland. The hopes are that mining can once again become an important sector of the country's economy.

References Cited

- Metal Bulletin, 1997, Denmark tries to ban most lead: Metal Bulletin, no. 8229, p. 27.
Mining Journal, 1997, Platinova diamond: Mining Journal, v. 329, no. 8441, p. 116.

Major Sources of Information

Geological Survey of Denmark and Greenland
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2400 Copenhagen NV, Denmark

TABLE 1
DENMARK: APPARENT PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1993	1994	1995	1996	1997 e/
Aluminum metal, secondary	14,000	15,000	14,000 e/	14,500 e/	14,000
Cement, hydraulic	2,270,000	2,430,000	2,584,000	2,628,528	2,683,039 3/
Chalk	386,000	414,000	366,000	359,378	427,634 3/
Clays:					
Fire clay	13,400	1,530	2,000 e/	1,800 e/	20 3/
Kaolin e/	3,500	3,500	3,500	3,000	3,000
Other	267	224	6,000 e/	8,050 e/	8,000
Moler e/	95,000	95,000	180,000 r/	182,000	248,000
Extracted moler e/ 2/ thousand cubic meters	190	190	186 3/	185	185
Gas:					
Manufactured e/ terajoules	1,700	1,700	1,500	1,210 3/	1,500
Natural:					
Gross e/ 2/ million cubic meters	6,350 3/	6,900	6,320	7,500	9,530 3/
Marketable do.	4,270	4,630	4,700	5,710 3/	6,960 3/
Iron and steel metal, steel: 2/					
Crude	603,000	722,000	654,000	737,000 r/	787,000 3/
Semimanufactures	527,000	638,000	631,000 r/	621,000 r/	625,000
Lime, hydrated and quicklime	123,531	125,000	117,000	108,628	115,129 3/
Natural gas plant liquids e/ thousand 42-gallon barrels	48,000	48,000	46,000	45,000	45,000
Nitrogen, N content of ammonia e/	1,770 3/	1,700	1,600	1,600	1,600
Peat	188,709	190,000	205,000	204,465	205,000
Petroleum:					
Crude 2/ thousand 42-gallon barrels	63,500	68,800	67,858	78,795 r/	83,950 3/
Refinery products: e/					
Liquefied petroleum gas do.	1,700 3/	1,600	1,600	13,879 3/	1,600
Gasoline do.	12,800 3/	30,000	32,000	31,247 3/	30,200 3/
Naphtha do.	1,210 3/	1,200	1,200	1,666 3/	1,200
Mineral jelly and wax do.	4 3/	4 3/	4	-- r/	--
Jet fuel do.	1,630 3/	1,930 3/	1,800	1,800	1,800
Kerosene do.	109 3/	110	100	93 3/	100
Distillate fuel oil do.	31,400 3/	28,400 3/	28,000	26,590 3/	28,000
Refinery gas do.	1,700	1,700	1,700	2,880	1,600
Lubricants do.	300	260 3/	300	300	300
Residual fuel oil do.	15,600 3/	13,700 3/	13,500	15,951 3/	13,500
Bitumen and bituminous mixtures do.	60	52 3/	50	-- r/	--
Petroleum coke do.	3	3	3	59 3/	60
Total do.	66,516	78,959	80,257	94,465 r/	78,360 r/
Phosphates, crude, gross weight	1,480	1,270	1,200 e/	1,200 e/	1,200
Salt, all forms	591,055	633,524	603,326	600,000 e/	600,000
Sand and gravel: e/					
Onshore thousand cubic meters	20,000	20,000	20,000	18,000	18,000
Offshore do.	5,000	5,000	5,000	5,000	5,000
Total do.	25,000	25,000	25,000	23,000	23,000
Of which, sand, industrial (sales) do.	125	25	50	50	50
Stone:					
Dimension (mostly granite) e/	26,000	24,800	25,000	27,198 3/	26,000
Limestone:					
Agricultural	584,000	703,000	826,000 e/	695,380	700,000
Industrial	220,000	252,000	250,000 e/	250,000 e/	250,000
Sulfur, byproduct	10,357	10,100	8,000 e/	7,465	10,585 3/

e/ Estimated. r/ Revised.

1/ Table includes data available through March 1998 based on estimated sales of domestically produced mineral commodities.

2/ Production.

3/ Reported figure.

TABLE 2
DENMARK: STRUCTURE OF THE MINERAL INDUSTRY IN 1997

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement		Aalborg Portland A/S	Plant at Rørdal	3,000
Chalk		A/S Faxe Kalkbrud	Quarries at Stevns and Sigerslev	250
Diatomite (moler)	thousand cubic meters	Skamol-Skarrehage A/S	Quarries on Mors and Fur Islands	115
Do.		Dansk Moler Industri A/S	Quarries on Fur Island	80
Kaolin		Aalborg Portland A/S	Mine and plant on Bornholm Island	25
Lime		A/S Faxe Kalkbrud (Aalborg Portland Holding A/S)	Plant at Stubberup, near Fakse, on Zealand Island	200
Natural gas	million cubic meters	Maersk Olie og Gas A/S	Roar and Tyra Gasfields, Danish North Sea	2,550
Petroleum:				
Crude	barrels per day	Dansk Undergrunds Consortium	Dan, Gorm, Rølf, and Tyra, Danish North Sea	127,000
Refined	do.	A/S Dansk Shell	Fredericia	55,000
Do.	do.	Kuwait Petroleum Refining A/S	Guldhavn	56,500
Do.	do.	Statoil A/S	Kalundborg	65,000
Salt		Dansk Salt I/S	Mine (brine) at Hvornum, plant at Mariager	600
Steel		Danish Steel Works Ltd. (Det Danske Stålværk A/S) (30% Government owned)	Plant at Frederiksværk	750